

REMARKS

Claim 3 has been canceled. New claim 21 have been added. Claims 1, 2, 4-21 are currently pending in the present application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

DRAWING OBJECTIONS

The drawings that were submitted upon filing of the application are objected to as being informal acceptable for examination purposes only on page 2 of the Action. In response, eight (8) sheets of formal drawings are submitted herewith. Approval of the formal drawings is respectfully requested. No new matter has been added.

REJECTION OF CLAIMS UNDER 35 U.S.C. 102

Claims 1-3 and 13 are rejected under 35 U.S.C. 102 for the reasons set forth on page 2 of the Action. Specifically, claims 1-3 and 13 are rejected under 35 U.S.C. 102 as being anticipated by Izumiyama (US Pat. No. 5,705,960), which is hereinafter referred to as the Izumiyama reference.

The rejections under 35 U.S.C. 102 are respectfully traversed, at least insofar as applied to the amended claims, and reconsideration and reexamination of the application is respectfully requested for the reasons set forth herein below.

Paragraph 4 on page 2 of the Action identifies those elements of the Izumiyama reference that describe or otherwise anticipate the elements as claimed. Specifically, the Office Action asserts that elements 7a, 7b of FIG. 1 of the Izumiyama reference teach the first structure as claimed, and element 6 of FIG. 1 of the Izumiyama reference teaches the second structure as claimed.

While it is true that elements 7a and 7b form a balun and that element 6 is a type of filter, the Izumiyama reference fails to teach or suggest a single component that integrates therein both a balun and a filter as claimed.

Page 3 of the Action further cites column 5, lines 39-41 of the Izumiyama reference as teaching the component as claimed. Column 5, lines 39-41 of the Izumiyama reference states

"The frequency converting circuit of FIG. 3 is different from the conventional circuit of FIG. 6 only in that the conventional balanced-to-unbalanced converters 3 are replaced with the balanced-to-unbalanced converters 7a and 7b of the present invention, respectively."

However, it is respectfully submitted that this portion of Izumiyama reference does not teach or suggest integrating a filter and balun into a single component as claimed.

Furthermore, it is respectfully submitted that elements 7a, 7b and 6 of FIG. 1 of the Izumiyama reference do not fairly teach or suggest the component according to the invention as claimed.

Referring to FIG. 3 of the Izumiyama reference, it is clear that the band pass filter 6 and the balanced-to-unbalanced converters 7a and 7b are individual components that are coupled together through terminals (e.g., terminals 2f, 2c, 2d, and 2e). In fact in a portion of the Izumiyama reference cited on page 3 of the Action, the references states in column 2, lines 13-16

".. the IF amplifier 4, the local oscillation circuit 5, the bandpass filter and so on as illustrated in FIG. 6 are surface-mounted type components and are mounted on the first printed circuit layer 1a, similarly as the double balanced mixer 2." [emphasis added]

In view of the foregoing, it is respectfully submitted that Izumiya reference fails to teach or suggest integrating a filter and balun into a single component as claimed.

REJECTION OF CLAIMS 4-12 AND 14-16 UNDER 35 U.S.C. 103

Claims 4-12 and 14-16 are rejected under 35 U.S.C. 103 for the reasons set forth beginning in the middle of page 3 and continuing through the middle of page 5 of the Action. Specifically, claims 4-12 and 14-16 are rejected under 35 U.S.C. 103 as being unpatentable over Izumiya (US Pat. No. 5,705,960), in view of Einbinder (US Pat. No. 5,361,050) which is hereinafter referred to as the Einbinder reference, and Imbornone (US Pat. No. 6,137,376), which is hereinafter referred to as the Imbornone reference.

The rejections under 35 U.S.C. 103 are respectfully traversed, at least insofar as applied to the amended claims, and reconsideration and reexamination of the application is respectfully requested for the reasons set forth hereinbelow.

Einbinder Reference

The Action on page 4 second full paragraph cites Einbinder for the teaching that there are two elements for performing impedance transforming at the input and output ports. Specifically, FIG. 3 and col. 2, lines 55-69 and col. 3, lines 13-23 are referenced.

FIG. 3 illustrates a bandpass filter 40 with a single ended input port and a differential and a mixer 316. The bandpass filter 40 includes a first microstrip split-ring resonator 12 and a second microstrip split-ring resonator 14.

However, it is respectfully submitted that Einbinder fails to teach or suggest integrating a balun and filter in a single component. Furthermore, Einbinder fails to teach or suggest the specific limitations recited in claims 9-11, such as the specific implementations of the balun recited in claims 9 and 10, and the impedance transforming elements recited in claim 11.

Imbornone Reference

The Action on page 4 fourth full paragraph cites Imbornone for teaching of a first stage that is a filter and a second stage that is a balun. Specifically, FIG. 3, elements 12, 13, 14 and col. 2, lines 47-49 and col. 5, lines 39-41 are referenced.

It is respectfully submitted that Imbornone fails to teach or suggest integrating a balun and filter in a single component. Furthermore, Imbornone fails to teach or suggest the specific limitations recited in claims 14-15.

On page 4, fourth full paragraph, the Action states that Imbornone et al. discloses a component comprising a first stage and a second stage. The Action continues to state, “The first stage is a filter (30) and the second stage is a balun (fig. 3, 12, 13, 14). It would have been obvious to one person having ordinary skill in the art at the time the invention is made to incorporate the teaching references for reducing the flow of current in ground circuits (col. 2, lines 47-49).”

Applicant respectfully disagrees with the above interpretation of the Imbornone reference. It is submitted that the Imbornone reference fails to teach or suggest the filter and balun as claimed in claims 14 and 15. It is noted that element 30 of FIG. 3 and FIG. 4 is not a filter, but is simply a capacitor (C1 of FIG. 4), and elements 31 and

32 are contact pads for attaching capacitor C1. In contrast to being a filter, the capacitor C1 appears instead to be employed to form part of the balun circuit.

"Unlike many other BALUN circuits the present invention employs no ferrites. The high impedance necessary to reject the unbalance signal is provided by L-C parallel resonance. The circuit for providing these resonances is shown in FIGS. 3 and 5. In both of these Figures what is shown is a top view of a BALUN formed on a printed circuit board by means of conventional circuit printing methods. The pads for capacitor connection are shown where discrete capacitors are mounted." (Imbornone reference, Col 4, lines 8 – 16).

In this regard, element 30 does not teach or suggest a filter that includes a differential input and a differential output as claimed.

Furthermore, elements 12, 13, and 14 of FIG. 3 of the Imbornone reference do not form a balun, as claimed. In fact, element 12 is described as a conductor, and elements 13 and 14 are described as output nodes. Instead, the balun of the Imbornone reference is comprised of all the components and elements of FIG. 3 or FIG. 5. For example, FIG. 3 is a "top view of a balun made in accordance with the present invention," and FIG. 5 is a "top view of a BALUN similar to that shown in FIG. 3 except that in this instance at least 2 of the capacitive elements are provided by means of interdigitated conductors which are also printed on an insulative substrate." FIG. 4 is a schematic diagram illustrating "an equivalent circuit for the BALUN devices shown in FIGS. 3 and 5."

Furthermore, the Imbornone reference fails to teach or suggest "a component comprising a single ended input and a differential output, a first stage, and a second stage ..; wherein the filter is in the first stage" and "wherein the balun is in the second stage" as claimed in claim 14.

Moreover, the Imbornone reference fails to teach or suggest “a component comprising a differential input, a single ended output, a first stage, and a second stage ..; wherein the balun is in the first stage” and “wherein the balun is in the second stage” as claimed in claim 15.

The Cited References Fail to Identify or Address the Problem Addressed by the Present

Invention as Claimed

The cited references fail to identify or even recognize the problem that is identified and addressed by the present invention. The specification of the present invention on page 3, lines 3 to 7 identifies a specific problem encountered in radio frequency (RF) and microwave circuit designs that the present invention solves:

“Currently, the filter component and balun component are provided as separate components with their own respective housing. These separate components are then typically soldered to a printed circuit board to achieve a desired functionality. The separate filter component and balun component increase system cost, occupy valuable board space and require extra design effort.” [emphasis added]

The specification of the present invention on page 3, lines 8 to 13, further sets forth a solution to the above problem and describes the benefits of the invention as claimed by stating:

“Since many designs are implemented in portable handsets or other portable computing devices, the size and weight of the components that are utilized in a design are important considerations. Consequently, it is desirable for there to be a technology that integrates the filter functionality and the balun functionality into a single

component, thereby saving board space, decreasing system costs, and simplifying the design effort." [emphasis added]

This problem is neither taught nor suggested by the cited references. First, the cited references do not appear to describe the problem of having the filter functionality and the balun functionality in separate components. For example, the Einbinder reference is directed to a balanced split ring resonator. Similarly, the Imbornone reference is directed to a printed BALUN circuits. As noted previously, the Izumiyama reference shows a balun and a filter in some figures. However, the Izumiyama reference clearly shows that the balun components and the filter are separate components.

Accordingly, it is respectfully submitted that the cited references do not identify the problem identified by the present invention, and in fact, the cited references are directed to a corresponding different and unrelated problems. It is further submitted that the Izumiyama reference, alone or in combination with the Einbinder reference and the Imbornone reference, cannot be fairly interpreted to teach or suggest the component of the present invention as claimed. Accordingly, it is respectfully requested that the rejections under 35 U.S.C. 103 be withdrawn.

REJECTION OF CLAIMS 17-20 UNDER 35 U.S.C. 103

Claims 17-20 are rejected under 35 U.S.C. 103 for the reasons set forth beginning in the middle of page 5 and continuing through page 6 of the Action. Specifically, claims 17-20 are rejected under 35 U.S.C. 103 as being unpatentable over Izumiyama (US Pat. No. 5,705,960), in view of Yeh (US Pat. No. 5,164,690) which is hereinafter referred to as the Yeh reference, and Imbornone (US Pat. No. 6,137,376).

The rejections under 35 U.S.C. 103 are respectfully traversed, at least insofar as applied to the amended claims, and reconsideration and reexamination of the application is respectfully requested for the reasons set forth hereinbelow.

The Action on page 5, paragraph 7 states “teaches (see fig. 1) a balanced-to-unbalanced converting circuit comprising a filter integrated with a balun that includes a single ended and differential port.”

First, as discussed previously, the Izumiya reference does not teach or suggest a single component that has housed therein a balun and a filter, as claimed. In fact, FIG. 1 of Izumiya reference does not show any filter element. Furthermore, the bandpass filter 6 shown in FIG. 3 and FIG. 6 is a separate component that is distinct from the balun components 7a and 7b.

Second, the Yeh reference, which is directed to a “Multi-pole split ring resonator bandpass filter,” also does not fairly teach or suggest single component that integrates therein a balun and a filter as claimed.

Third, as noted previously, element 30 of the Imbornone reference does not teach or suggest the filter that includes a differential input and a differential output as claimed in claim 17.

Furthermore, elements 12, 13, and 14 of FIG. 3 of the Imbornone reference do not form a balun. Element 12 is a conductor, and elements 13 and 14 are output nodes. As noted previously, the balun is comprised of all the components and elements of FIG. 3 (a top view of a balun) and FIG. 5 (top view of a BALUN similar to that shown in FIG. 3 except that in this instance at least 2 of the capacitive elements are provided by means of interdigitated conductors which are also printed on an insulative substrate) of the Imbornone reference.

Consequently, it is respectfully requested that the rejections under 35 U.S.C. 103 be withdrawn.

In view of the foregoing, it is respectfully submitted that all pending claims of the present invention are now in condition for allowance. Reexamination and reconsideration of the pending claims are requested, and allowance at an early date solicited. The Examiner is invited to telephone the undersigned if the Examiner has any suggestions, thoughts or comments, which might expedite the prosecution of this case.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents and Trademarks, Washington, D.C. 20231 on the date below.

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September 13, 2002
(Date)